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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,083	11/21/2003	Young Sun Hwang	30205/39513	2261

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EXAMINER	
GEORGE, PATRICIA ANN	

ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/719,083	HWANG ET AL.	
	Examiner	Art Unit	
	Patricia A. George	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) *10* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *10* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11-21-03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of group I in the reply filed on August 8th, 2005 is acknowledged. Claim 10 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected group, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on August 8, 2005.

Claim Objections

Claim 1 has a typo, please make the following correction: the word *"form"* (in line 9) is likely to mean *–from--*.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1, 3-5, and 7-8 are rejected under 35 U.S.C. 102(a) as being anticipated by Meador et al. of 193-nm Multilayer Imaging Systems [Proc. SPIE Vol. 5039, June 2003, Advances in Resist Technology and Processing XX; Theodore H. Fedynyshyn; Ed.].

Meador et al. clearly anticipated all limitations of claim 1 when forming a tri-layer microlithography system using embedded etch masking layers (EMLs) and bottom antireflective coating (BARCs). (ab., l.2-3) Meador et al. disclosed combining the EMLs with tri-layer BARCs results in outstanding Prolith simulated reflectance control. (ab. l.9-10). Meador et al. teaches coating a BARC layer on a substrate layer (Fig.1 part: BARC); coating a middle layer (Fig.1, Part: M. LAYER) which includes using spin-on-glass (SOG), silicon containing polymers, and silicon dioxide chemical vapor deposition (CVD) films (Sec. 3, l.2), all having high O2 selectivities (Table.3), which indicates the film absorbing gas generated from the photo resist film upon exposure to light, and is also evidenced by Hayase et al. (col.4, l.9-12). Meador et al. anticipated coating the middle layer with one of a wide variety of 193-nm photo resist materials (sec. 3.2); performing a photolithography process on the resulting structure to form a photo resist film pattern (Fig. 1); etching the etching mask layer of claimed step (b) using the photo resist film pattern as an etching mask to form an etching mask pattern (Fig. 1); and forming an underlying layer pattern by an etching process using the etching mask pattern (Fig. 1).

As for claim 3, wherein the gas protecting film is capable of absorbing the silicon gas, see the discussion above.

As for claims 4 and 7, Meador et al. anticipated the photo resist composition is for a process employing a light source of 193-nm Imaging Systems (ti.).

As for claim 5, Meador et al. anticipated the middle layer, comprises water-soluble polymer materials selected from the claimed group, such as: PGMA and PGMAE (sec. 3.1.3, l.5-6, and further evidence in MSDS attachments).

As for claim 8, Meador et al. anticipated spin coating and hot plate baking the coated compositions (ab. l.3).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meador et al. (see discussion above) in view of Adna et al of USPN 6,153,499.

Meador et al. disclosed forming a tri-layer microlithography system using embedded etch masking layers (EMLs) and bottom antireflective coating (BARCs). (ab., l.2-3) Meador et al. disclosed combining the EMLs with tri-layer BARCs results in

outstanding Prolith simulated reflectance control. (ab. l.9-10). Meador et al. teaches coating a BARC layer on a substrate layer (Fig.1 part: BARC); coating a middle layer (Fig.1, Part: M. LAYER) which includes using spin-on-glass (SOG), silicon containing polymers, and silicon dioxide chemical vapor deposition (CVD) films (Sec. 3, l.2), all having high O2 selectivities (Table.3), which indicates the film absorbing gas generated from the photo resist film upon exposure to light, and is also evidenced by Hayase et al. (col.4, l.9-12). Meador et al. teaches the middle layer, comprises water-soluble polymer materials selected from the claimed group, such as: PGMA and PGMAE (sec. 3.1.3, l.5-6, and further evidence in MSDS attachments). Meador et al. discloses coating the middle layer with one of a wide variety of 193-nm photo resist materials (sec. 3.2); performing a photolithography process on the resulting structure to form a photo resist film pattern (Fig. 1); etching the etching mask layer of claimed step (b) using the photo resist film pattern as an etching mask to form an etching mask pattern (Fig. 1); and forming an underlying layer pattern by an etching process using the etching mask pattern (Fig. 1).

Meador et al. discloses the middle layer is selected from PGMEA (sec. 3.1.3, l.5-6), which is not of the group of poly acrylic/vinyl materials listed in claims 6 and 9.

Adna et al teaches i-line photolithography, and the use of poly acrylics or PGMEA (col.4, l.20).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to substitute PGMEA, as used by Meador, for the poly acrylic/vinyl

materials, of Adna, because Adna et al. teaches it is a known material used for the same functional results which makes it substitutable for poly acrylic materials.

Claim Rejections - 35 USC § 103

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meador et al. (see discussion above) in view of Shibata et al. of Material and Process Development of Tri-level Resist System in KrF and ArF Lithography [Proc. SPIE Vol. 4690, July 2002, Advances in Resist Technology and Processing XIX; Theodore H. Fedynyshyn; Ed.].

Meador et al. fails to teach the tri-level etching mask layers are formed by use of KrF photo resists, as in claim 2.

As for claim 2, Shibata et al. clearly teaches the tri-level etching mask layers are formed by spin coating a KrF photo resist layer system (ab., l.7-8).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to include the use of KrF resists, as taught by Shibata, when forming the tri-level resist system of, Meador, because Shibata teaches the KrF tri-level system provides a low reflectivity which is known to produce optimum depth to focus, which is know to enhance profile images and yield deeper trenches.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

USPN 5,702,776 teaches organic polysilane materials absorbs energy of UV rays, and oxidizes by absorbing oxygen.

USPN 5,959,298 teaches tri-level resists.

High Performance 193-nm Positive Resist Using Alternating Polymer Systems of Functionalized Cyclic Olefins/Maleic Anhydride [Proc. of SPIE conf. Vol. 3999, March 2000, and published by JRS Corporation in 2002], and USPN 5,962,191 all teach KrF photo resists are water-soluble.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patricia A. George whose telephone number is (571)272-5955. The examiner can normally be reached on weekdays between 7:00am and 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571)272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patricia A George
Examiner
Art Unit 1765

PAG
08/05

NADINE G. NORTON
SUPERVISORY PATENT EXAMINER